15: Bunker N-4 (ca. 1960) 1963 MM2 Hadhramaut MM2

the amount of evaporation. Accordingly we find in the north–south wadis a continuous belt of cultivations with hamlets of a few houses every mile and towns about 15 miles or an easy day's walk apart. As opposed to this the cultivations in the Wadi Hadhramaut, which runs west–east, are to be found mainly in belts along the northern and southern sides, the south belt being wider than the north, due to the increasing evaporation and lower water table towards the centre of the wadi.

Except for the hamlets which occur among the fields, the buildings make use of unproductive land, and perch up against the cliff side on the talus slope. This position also carries the advantages of shade together with good siting for defence. Where land is at a premium, villages may be so sited as to become inaccessible even to the draught and load-carrying beasts used in agriculture, and the stables and grainstores are found at the edges of the fields and at the foot of the narrow winding path leading up to the village (Plate 3).

Water for the permanent cultivations of *dhurra* (*Sorghum* sp.), *dukhn* (*Pennisetum typhoidrum* et spp.), lucerne and date palm has until the last few years been drawn by man or animal power, raising a leather bag of water by walking down a ramp away from the well shaft. Nowadays greater use is being made of diesel- and petrol-driven pumps, increasing both the yield and the area it is economical to cultivate. The effect of these pumps, which are available on deferred terms, in lowering the water table will be watched with care. New crops such as potatoes, the brassicas, and sugar cane are also being introduced under the agriculture scheme in an attempt to make the Hadhramaut, if not entirely self-supporting, at least less dependent on its "extra-territorial population." [6]

This limitation does not apply to the flood crops which are snatched wherever possible. Throughout the lower wadi systems there exists a complicated network of deflector dams which have the object of spreading the floodwaters over as large an area as possible, and leading a certain part of them into irrigation channels. Many retaining dams have been attempted, but usually unsuccessfully, as the major structure has been an earthwork with only the spillway of durable construction. In the shallow beds of the wadis running north from the secondary watershed there are many small cultivated patches and groups of two or three fortified houses are often situated where camel tracks converge on water cisterns cut into the rock.

The transition belt.

The transition zone between the mountain systems and the sand desert takes a number of forms. North of the Ramlat[1] al Mundafan the Kaukab sandstone plateau overlies the crystalline rocks to the west, and to the east has eroded to become an area of minor plateaus and blocks. Through the wide flat valleys between these minor plateaus runs the main Najran–Dawasir track, roughly north–south in longitude 44° 45′ E. at a general height of a little under 3000 feet. To the east of this track lies the southern section of the Nafud Dahi, running parallel with the road, and rising to a height of 100 feet

[1] Ramla(t): a general name for any sand feature. Thus the Ramlat al Mundafan means literally "the buried sands."

G.Gt. Brit. Colonial Office G-3 (1948) 1950 MMI Aden
Hadhramaut

the management of irrigation farming on some 5,000 acres. The value of the Board's quarter-share of the net crop obtained, after paying harvesting and threshing expenses in kind, was estimated at over Rs. 1,25,000.

Farming in Abyan, largely influenced by the Board's operations, proved important to the economy of the Western Aden Protectorate. In the production of millet alone, it is estimated that a 30,000 bag crop, equal to 3,000 metric tons, was raised. A large portion of this was held as a reserve, or had been marketed to the easterly districts at the end of the year. General control on the export of this grain to Aden itself was maintained, and the flow of the crop to the districts to the east was encouraged.

The Wadi Hadhramaut Rehabilitation Scheme

This was wound up by Government at the end of the 1947–48 financial year. Farmers with outstanding loans were given ten years in which to repay, the basis of repayment being at the rate of 2 per cent of the total loan from the spring crop, 3 per cent from the autumn crop, and 5 per cent from the winter crop grown. By the end of the year, it was apparent that this system of deferred repayment was not proving satisfactory. Moneylenders had again become active, while late planting and reduced acreage were noticeable in many districts. This undoubtedly resulted from lack of foresight on the part of many farmers, who had failed to reserve sufficient seed and fodder and preferred to resort to moneylenders for obtaining their needs on credit.

At the end of the year, proposals were on hand for the introduction of numbers of diesel-driven irrigation pumps for use in the Wadi Hadhramaut.

Co-operation

The Beihan Farmers' Association, formed in the previous year, progressed in a satisfactory manner, and much useful experience was gained by the officials of the association. A good *saif* season helped the members, but this was followed by an almost complete lack of water in the *kharif*. In spite of these difficulties, the association was able to help its members in their requirements of seed, stock, and cash needed for well equipment and for concentrates for feeding livestock. At the end of the year, the association had acquired some Rs. 12,000 from members' subscriptions and from interest charged on loans.

This association cannot be termed a co-operative society in the true sense of the word. It is an association which has the full support of the local Government, and which at present makes use of Government offices and storehouses for its activities. In the present stage of development this is considered to be the most desirable form of association for Beihan.

Western Aden Protectorate

The Western Aden Protectorate fisheries are of minor importance compared with those of the Eastern Protectorate. Shuqra, the seat of the Fadhli Sultan, is, however, a fishing port with a considerable export trade in dried fish

?: Gt. Brit., Colonial Office G-3 (1949-50) 1951 MMI Aden
Hadramaut mmz.

Plant Introductions

137 242 Sann hemp and Dolichos beans were introduced from the Sudan. Tepary beans, bunch-type groundnuts, and velvet beans were introduced from Uganda. These new introductions were planted in observation plots in the Abyan district.

The introduction of deciduous fruits and of citrus for planting in the Audhali Sultanate continued.

Development Schemes

654 *The Abyan Board.* During 1949 the scheme, now furnished with sufficient capital to embark on its work as a proving scheme, developed at a satisfactory rate in all fields where adequate staff, machinery, and materials could be mustered.

406 654 332 A rebuilt D.7 Caterpillar tractor complete with bulldozer and carry-all scraper, and three D.4 Caterpillars, one with bulldozer attachment, were obtained through the Crown Agents. These rebuilt tractors were delivered without any spares and gave a certain amount of trouble, but were responsible, together with a D.6 Caterpillar already in the hands of the Board, for great progress in irrigation construction.

Important extensions were made to the Be Tes and Na'aza systems, while two new diversion systems were opened on the Wadi Hassan.

The tractors were generally worked as a fleet, with a mass of ox power owned or hired by the Board. Often 200 yokes of oxen—each with a scraper attached and each yoke with its driver/scraper operator in attendance—worked alongside the tractors. These were used for ripping and drawing masses of earth close to the dykes, which were then finished off by the oxen.

The value of the D.7 was judged to be equal to 150 to 200 yokes of oxen in earth-moving capacity, but for finishing off work and consolidation the use of oxen has been found to pay. Earth-moving costs have been low, and on short hauls of work of moderate height costs have not exceeded 6 annas per cubic metre.

654 Survey work has accelerated and a staff of 6 surveyors was at work in the field at the end of 1949.

A great deal of the Board's effort was devoted to the construction of offices, workshops and staff houses. At the end of 1949 substantial progress had been made and building, apart from some additions to staff houses and a projected pilot ginnery, had been completed.

The Board staff was increased considerably. On irrigation matters the Board continued to receive advice from Mr. N. Simansky, Irrigation Adviser to the Government of Jordan, who visited Abyan twice during the year. In September the staff was strengthened by the addition of an Irrigation Engineer, Mr. Douglas Hall, who joined the Board as Chief Engineer. In November Mr. B. May joined the Board on secondment, as Chief Accountant, the office having remained vacant since the resignation of the first Accountant Officer at the end of March. These two appointments were long overdue, and serious arrears of work had to be faced by both officers on taking up their appointments. In the

7: Gt. Brit., Colonial Office G-3 (1949-50) 1981 MM1 Aden

cultivators to get them back to their villages and re-establish them in time to sow their crops.

The famine of 1948–49 struck the western districts of Hadhramaut, where the situation was complicated by the dependence of these districts on rain and run-off water and flow irrigation from the wadis for crop production, and where large sections of the population relied on remittances from Hyderabad, which had been absorbed into the Indian Union, and from which transfers of currency had become difficult. Finally the repatriation of several thousand Southern Arabians, many of them from the tribes most seriously affected by the famine, brought further hardship.

Little could be done to improve agricultural conditions rapidly in these western areas of the Hadhramaut. It was therefore necessary to look to the lower areas of the main wadi where water is obtainable at easy levels, and farming can be secured by permanent irrigation.

Animal power for use on lift irrigation, and dependent on fodder crops cheaply produced only from the flood-irrigated areas, was now judged to have reached its maximum use. The Famine Relief Commissioner—in this case the Acting Resident Adviser—was advised that a large-scale pump scheme, using diesel-engined units, was the only measure which appeared to show promise of quick improvement in food production. The Commissioner and the States accepted this advice in detail and made important decisions in council which were framed to abolish all taxes on diesel engine and pumps for use on irrigation work, and on diesel oil (gas oil), and to purchase and supply cultivators with machinery for cash or for deferred payments.

The States further caused revision of an important agreement with Beduin tribes regarding the transport of fuel. In the past all trade goods, including petrol, kerosene oil, and lubricating oil, had been carried by camel caravans owned by Beduin tribes occupying the country between the coastal plain and the great wadis of the interior. With the opening of the road to the interior some fourteen years ago it was agreed that motor transport should carry only passengers and small quantities of personal luggage. In the present emergency the Beduin leaders were told of the need for motor transport to carry diesel oil for a famine relief scheme and were shown that the normal system of supplying diesel oil was in 44-gallon drums which have to be broken and repacked in drums of a size convenient for camel transport. The Beduins agreed to waive their rights, and so, for the first time in Hadhramaut history, a truly mechanised scheme, independent of the camel caravans—which are entirely dependent on fodder grazing and water supplies, which may fail in a drought—was evolved.

It was decided to spend up to £36,000 on a pump scheme. The Famine Relief Commission, acting on behalf of the States, arranged to purchase the machinery and to sell outright for cash or on a deferred payment system, in which case 25 per cent was added to the price for repayment over a four-year period. Speed was essential, and quotations and prices were examined for nearly every type of diesel-engined

B.Gt. Brit., Colonial Office G-8 (1951-52)1954 10041 Aden
Hadhramaut MM2

427 principal system involves some form of share-tenancy in which the partners divide the crop after harvesting, threshing and winnowing charges and tithes and taxes have been paid in kind. In more fertile areas half of the crop is demanded of the tenant of flood irrigated land, while in the mountain terrace-farming areas a share of one-third is normally levied. In the arid eastern districts shares of one-tenth only may be asked. On lift irrigation systems share-tenancy arrangements vary greatly. In the East, the owner of the land and the well may take a one-tenth share. In the West, the owner of the land and the well may take up to one-half of the crop, though often a share of the seed used and a share in the labour working on the lift irrigation is pro-
423 vided by the landowner. The Qua'iti and Kathiri States have secured legal powers by an agricultural administrative order to further the consolidation of plots round suitable irrigation points, but so far it has been unnecessary to apply such orders.

647 The Department of Agriculture has initiated important programmes
664 for the development of land and water resources. Of particular note is the Abyan Scheme in the Western Protectorate and the pump scheme in the Wadi Hadhramaut in the Eastern Protectorate. At the same time encouragement and organisation in the better use of the excellent indigenous systems of irrigation farming have been the main preoccupation in many districts.

423 Little satisfactory progress has been made in land settlement in the Abyan area. In the Eastern Protectorate, the States, advised by the
406 Residency, are actively encouraging groups of farmers to combine their holdings formerly watered by animal lift in order to make the co-operative use of the mechanical pump lifts an economic proposition.

241

AGRICULTURE

Principal Crops, 1952

	Acres	*Tons*	
Western Protectorate			
Sorghum Millet	23,333	4,,333	
Bullrush Millet and other small millets	9,000	1,,286	
Wheat	3,000	2,,000*	
Barley	6,000	4,,000*	
Sesame	4,250	425	
Cotton (long staple)	9,830	7,,206	bales of 400 lb. lint*
Coffee	400	100	
Eastern Protectorate			
Sorghum Millet (lift and permanent flow irrigated)	3,000	2,,400	
Sorghum (flood irrigated)	4,000	400	
Bullrush Millet and other small millets	1,500	300	
Wheat	2,600	3,,000	
Date Palms	10,500	7,,000	

* Crops sown in 1951 and harvested in 1952.

S.Gt. Brit., Colonial Office G-3 (1951-52)1954 M561 Aden
Hadhramaut M42

Agricultural Extension and Improvement Schemes

The main development scheme for irrigated land use is that in Abyan. A note on the scheme is given in Appendix I, page 84.

The extension work of the Department of Agriculture is carried on through departmental staff and through State agricultural departments where these exist. Extension work at the moment is mainly confined to a few selected subjects such as cotton growing, fruit and vegetable growing, and lift irrigation by pump.

Cotton Growing Schemes (other than at Abyan). Long-staple X.1730A cotton was introduced for cultivation to the Yeramis district, and from an area of approximately 400 acres some 472,665 lb. of seed cotton were marketed.

In Ahwar, where X.1730A cotton was grown for the second season, 436,311 lb. of seed cotton were marketed from an effective area of 400 acres.

The Hadhramaut Pump Scheme. In the Hadhramaut there has been considerable development of lift irrigation by diesel-engine pumping units since 1948. It is claimed that 389 pump units with an estimated total horse-power of 3,640 have now been introduced. A large percentage of the units have been sold by the Hadhramaut States to local farmers on a deferred payment scheme.

In 1952 pump units irrigated 37 per cent of the total area under lift irigation in the Hadhramaut. The average area irrigated per pump unit is estimated at 8.3 acres as compared with 2 acres by animal lift. The yield from pump irrigated crops in nearly all cases is found to exceed comparable animal lift irrigated crops. The schemes may be criticised on account of the high horse-power used for the irrigated area, but on the other hand with less working hours per day the machinery should theoretically last longer.

Credit Facilities

In the Western Protectorate advances have been made through Farmers' Associations, through the Abyan Board and through local States to assist farmers. In the Eastern Protectorate, particularly the Hadhramaut, large sums of money have been advanced since 1944 to enable farmers, or groups of farmers, to maintain local irigation systems and to help farmers to buy pumping machinery by hire purchase. Little or no progress can be made in the development of agriculture without credit facilities.

Agricultural Department

The staff comprises the Director of Agriculture, four Agricultural Officers, one Assistant Agricultural Officer and nine Agricultural Instructors.

The Department is responsible for giving advice on agriculture and, in many areas, for the organisation and administration of agricultural development projects. During the financial year 1952–53 it budgetted to spend £19,000.

S.Gt. Brit., Colonial Office G-3 (1951-52)1954 M361 Aden
Hadhramaut M82

654 312 which carry the water to bunded fields where the land is inundated to approximately one metre in depth. In the lower part of the district complete diversion of the flood is made by larger earth dams built across the river bed. Generally one metre depth of water is sufficient 241 to raise the crops of sorghum, sesame and cotton, though summer planted crops which have to grow when water is low are given one or two supplementary irrigations.

The date of arrival of the floods is uncertain and the pattern of crop production may alter considerably according to the date of irrigation. For instance, early summer floods will only be used for sorghum fodder, grain, melons and sesame. Later summer irrigations are particularly required for cotton planting and for the autumn sown sorghum crop.

The Farming System

Skilled cultivation is carried on by settlers from many South Arabian tribes who have come to the area since the start of the scheme. Bunding of land, construction of field channels, ploughing and sowing are carried out by draught animals, mainly oxen though camels are brought in to help occasionally. No fertilisers are used at present ; the flood brings with it a heavy burden of silt which reaches the land and maintains its fertile state.

The basic problems concern the farming system. One is largely an irrigation problem caused by a rapid rise in the water-table which has taken place since irrigation was resumed. This rise in the water-table has caused an accumulation of salts in the upper layers of the soil, and has already made crop production on 2,000 acres practically impossible by flood irrigation methods. The other problem is weed control. As a gross area of 100,000 acres may be commanded in the future, and within this area an annual average of 30,000 acres may be cropped, it should be possible to afford long periods of fallow to land in order to reduce the dangers which may arise from heavy irrigation ; but individual ownership of land will greatly complicate such arrangements.

248 243 246 At the present time the cotton variety X.1730A, a derivative of Sakel, is the main cash crop grown. All other cash crops in the scheme are common to those of other irrigation tracts of a similar type in South Arabia though there are experimental crops, of which sugar is one. An important feature of the scheme is the need for a large area of sorghum for grain and fodder production. The draught animals depend almost entirely on sorghum fodder for their sustenance and the main food of the people is sorghum millet. It is expected that for some time two-thirds of the area will be maintained under sorghum and one-third under cotton.

Mechanical Equipment

406 242 The Board owns earth-moving machinery powered by diesel-engined crawler tractors with carry-all scrapers, bulldozers, a ripper and grader and two drag-line scrapers. The policy of the Board is to increase the

S.Ct. Brit., Colonial Office G-3 (1951-52)1954 MMI Aden
Hadhramaut HM2.

mechanical equipment required for irrigation construction and maintenance in order to release work oxen for field operations. Up to the present shortage of equipment, break-downs and delays in obtaining spares have made it necessary to employ large numbers of working cattle on earth-moving and general irrigation works.

The Board also owns a fleet of twelve diesel-engined crawler tractors for ploughing work. Considerable difficulties have been encountered in maintaining this tractor fleet.

Administration of the Scheme

The present composition of the Board is :

British Agent, Western Aden Protectorate	Chairman.
Director of Agriculture, Aden Protectorate	Managing Director.
Senior Political Officer, Southern Area	Director.
Two Representatives, (Fadhli State)	Members.
Two Representatives, (Yafa'i State)	
Manager, Abyan Board	Secretary.

The Board is responsible for the construction and maintenance of capital works and of main and minor canals ; the development of new land for irrigation ; the delivery of water to the land ; provision of marketing and credit facilities to farmers, when necessary.

The Board receives one-quarter share of the crops grown. This is now based on a cash payment of *Shs.*40 per effectively cropped acre for all crops other than cotton. The assessed amount is deducted from the cash payment made for the cotton crop.

The Board in the 1952–53 season made a cultivation advance of *Shs.*90 per acre of effectively established, thinned and cleaned cotton.

The Board provides seed-cotton packs and conducts weekly markets at convenient centres throughout the area. The cotton is classified at the markets by an expert cotton classifier. Each pack carries the grower's identification number, the weight as recorded at the sale and the market identification letter. A record is made of quantities sold at each market by growers and cash is paid after deduction of the Board's share. The cotton is ginned and baled in a ginnery equipped and run by the Board. The whole of the graded lint is sold under a long-term contract with the Raw Cotton Commission. The Abyan X.1730A is regarded by buyers as equal to Sudan grown crop of similar type.

Tenants make up and maintain bunds and field channels, cultivate specified crops as the Board directs, pay the crop share due, and deliver crops such as cotton to markets as directed.

Landlords, if owner occupiers, cultivate their own land and follow

30: Gt. Britain G-5 (ca. 1918) 1920 NJI Saudi Arabia
Hadhramaut MM2

Irrigation is almost entirely artificial; neither the rains nor the variable streams are in general adequate to this purpose, and watering of the soil is mainly carried on from wells. These may be sunk practically everywhere in the valleys. As in many other parts of Arabia, the water is drawn up in a leather hoist by animals, usually cows, attached to a cord which passes over a pulley supported on wooden struts; the water thus obtained is received in a large wooden trough whence it is spread over the land by means of little runnels.

Cattle-rearing is the principal occupation of the Bedouins. Camels and donkeys are reared for transport purposes; sheep for killing and for milk; cows only for milk and irrigation work; oxen exclusively for ploughing. Horses are very rare and are considered as animals *de luxe*. Bees are numerous, and much honey is produced. The wild animals most largely found are the rabbit, gazelle, wild goat, jerboa, hyena, hedgehog, a large species of lizard (permitted as food to Mussulmans), and the panther, wolf, and monkey (not permitted as food).

Trade and Commerce

The only ports of importance commercially are Makalla (see p. 232), Shiheir (see p. 232), and Seihût (see p. 230), and even at these the trade carried on is purely coastal, with the near coast of Africa, the Red Sea, the Persian Gulf and the southern coast of Arabia, and above all with Aden and Muscat. Trade by caravan is carried on from these ports with the whole of the interior of the Hadhramaut and with the southern Arabian littoral as far as Yemen on the west and Oman on the east. Burûm (see p. 233) and Qusei'ir are small fishing villages.

There are no made roads; the routes follow the courses of the wâdis or natural paths. Transport by wheeled vehicles is impossible everywhere; all is carried on by camels or donkeys. It is, however, relatively cheap; e. g. a camel from Shiheir or Makalla to Seyyûn costs only 5 florins in the good season; in summer, when forage is scarce, it is higher, but never above 10 florins.

The chief exports are dates, stuffs dyed with indigo, a superior quality of wheat, and honey; smaller exports are shells and fins of fish, the latter exported to India and China. Imports: wheat, butter, coco-nuts, coffee, sugar, rice, cotton and cotton stuffs, pottery, bars of iron and worked iron, sesame oil, petroleum, and tin-ware.